

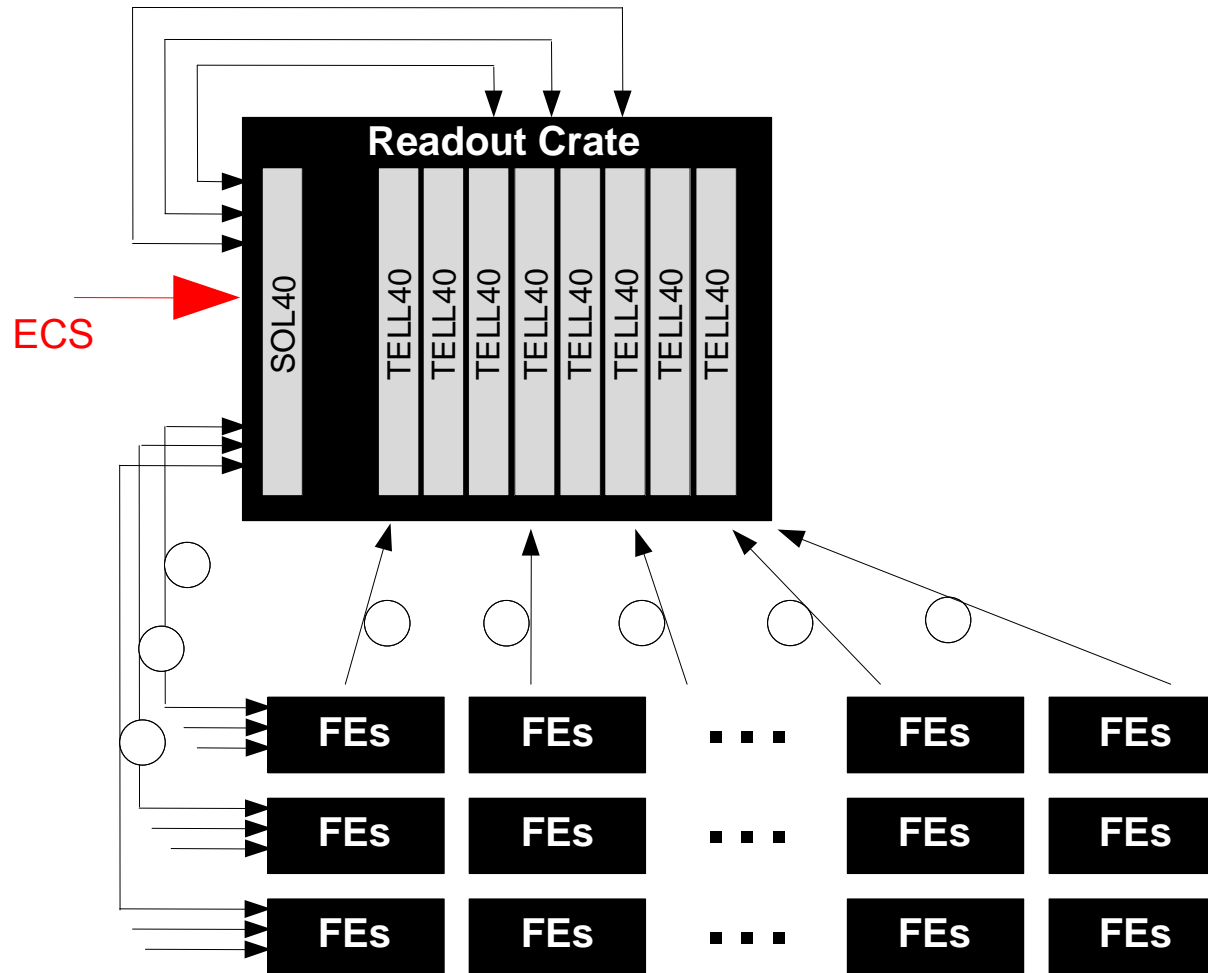
# Introduction

- The present calorimeter ECS is mainly based on SPECS
  - Front-end, LED pulsing, HV, Integrators
- We suppose that we will keep the rest unchanged
  - Power supplies (Maraton), Turbines, HCAL rad. Source (CanBus)
- SPECS will probably not be supported for the upgrade
  - Do not want to be alone to maintain SPECS
  - Follow the overall collaboration → **GBT**
- This is not a problem for systems which have to be re-designed
  - We would like to keep some of our boards which are based on SPECS

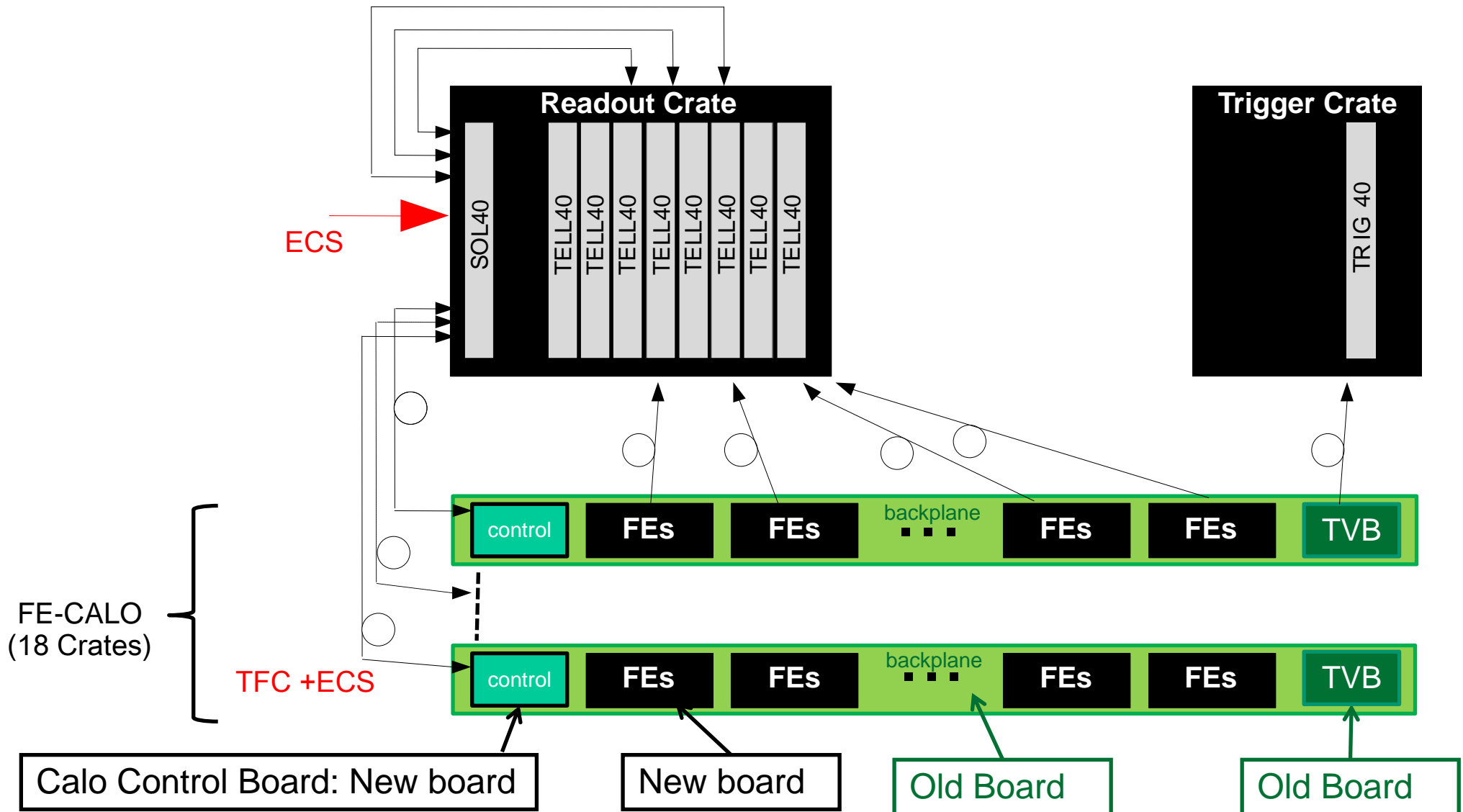
# The cases

- 3 cases :
  - 1) Electronics in FE crates and to be re-designed (FEB, control board)
  - 2) Electronics in FE crates kept and based on a SPECS slave (TVB)
  - 3) Electronics kept and based on a SPECS mezzanine (e.g. HV)
- We have to find a “GBT solution” for all of these cases

# SOL40 to FE



# SOL40 to FE-CALO



# TFC protocol to FE-CALO

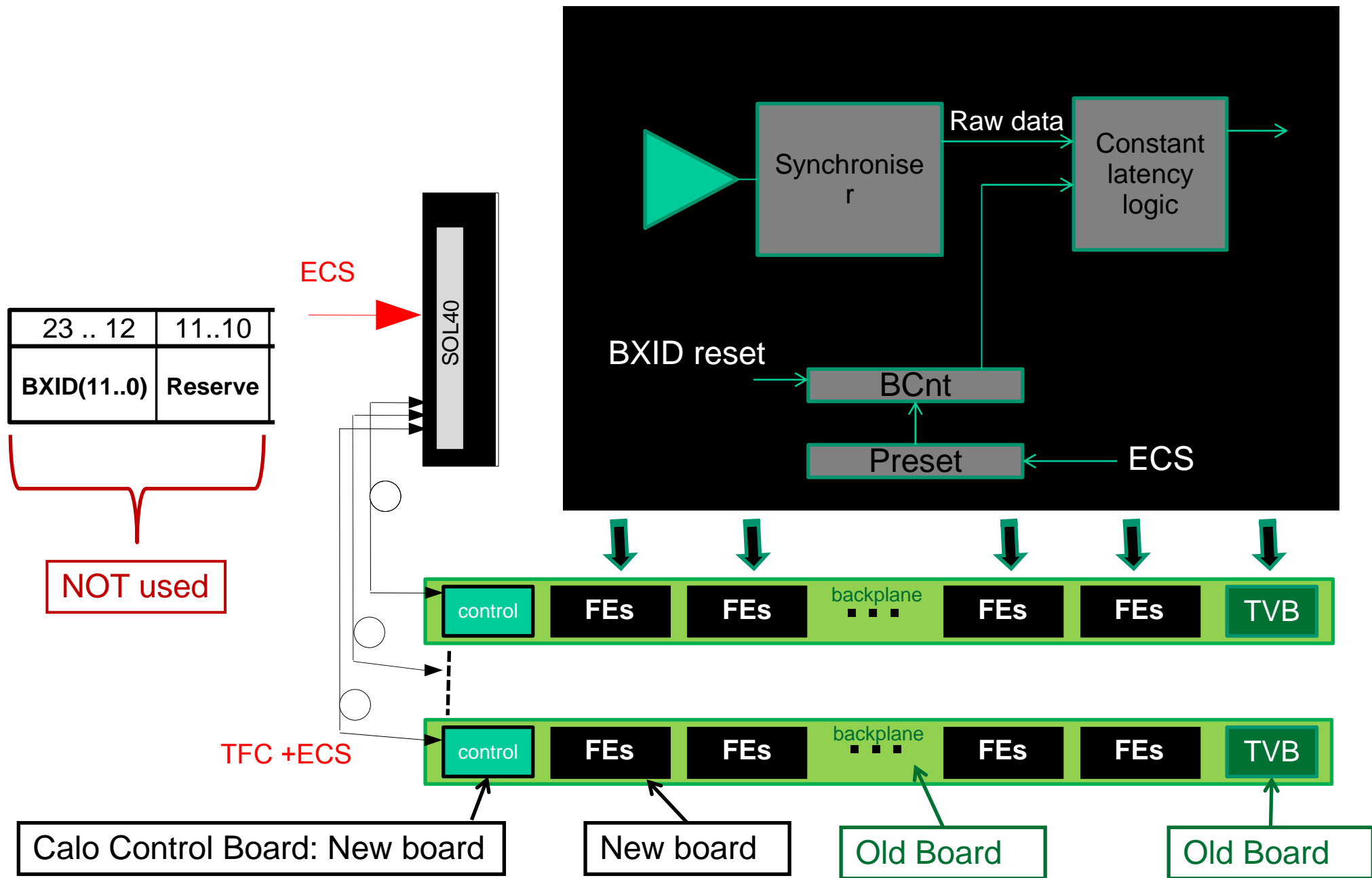
23 .. 12	11..10	9	8	7 .. 5	4	3	2	1	0
BXID(11..0)	Reserve	Synch	Snapshot	Calibration Type(2..0)	BX Veto	NZS Mode	Header Only	FE Reset	BXID Reset

NOT used

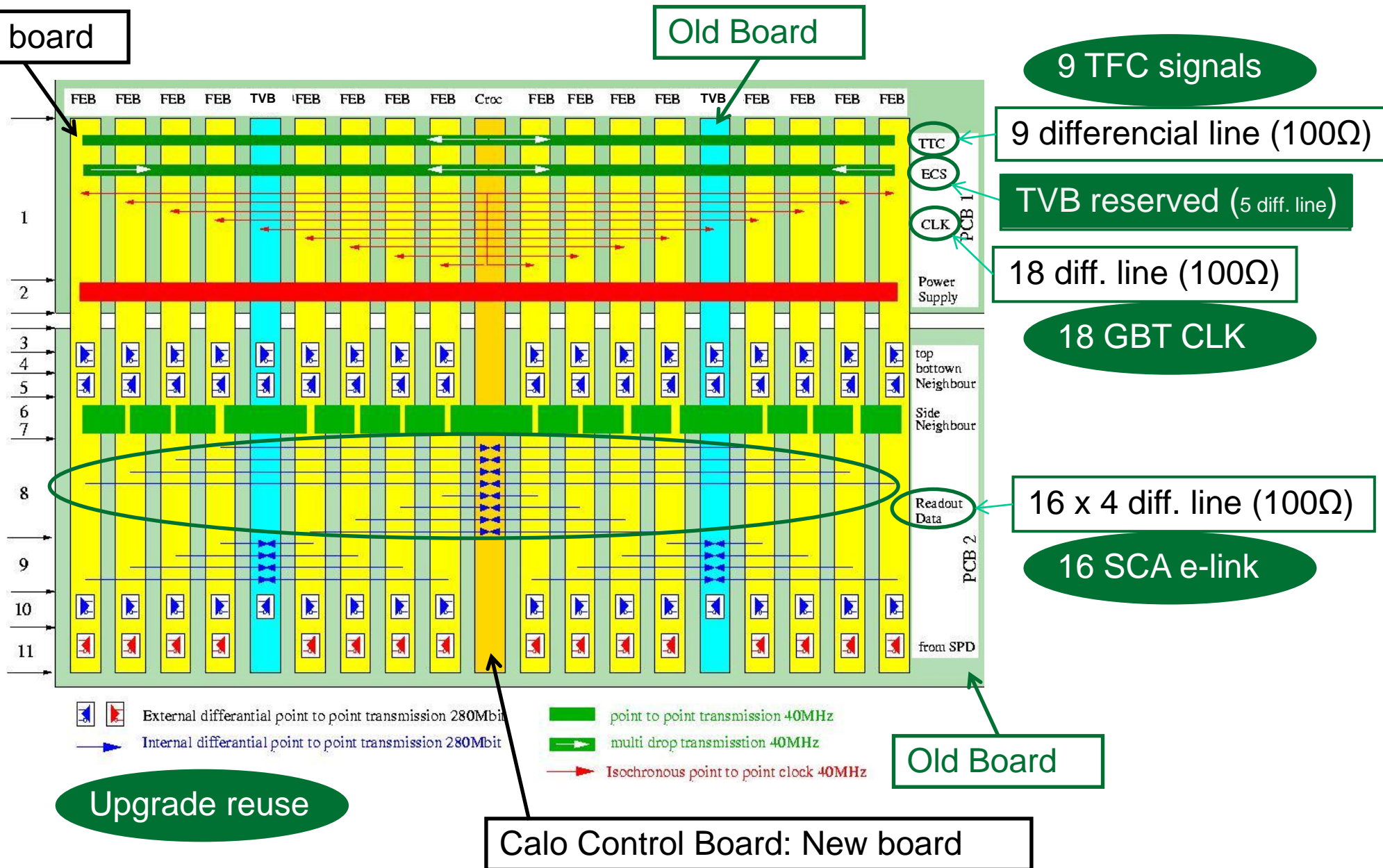
t.b.c.

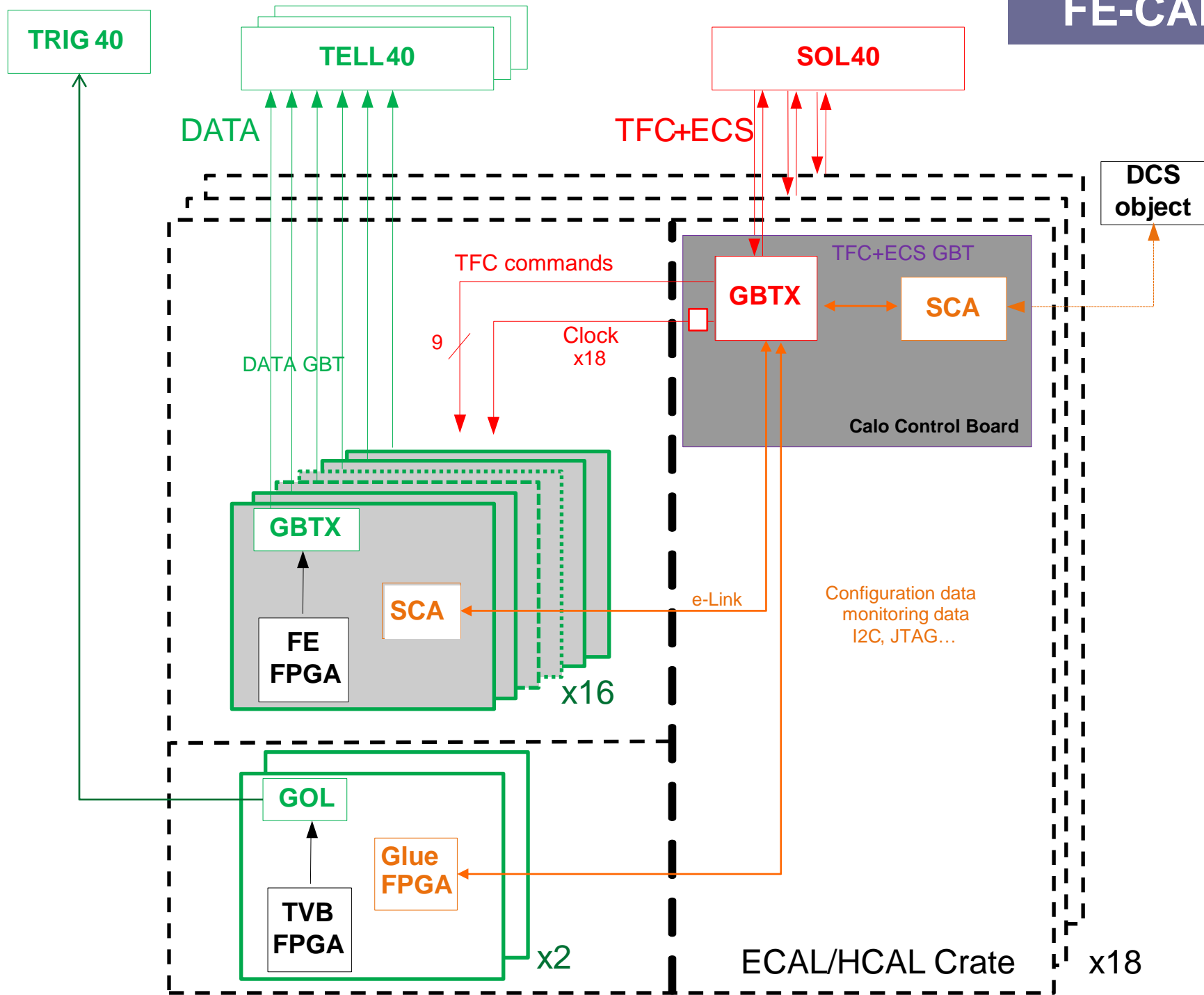
Used in ECAL backplane (old TTC line)

# BXID in FE-CALO



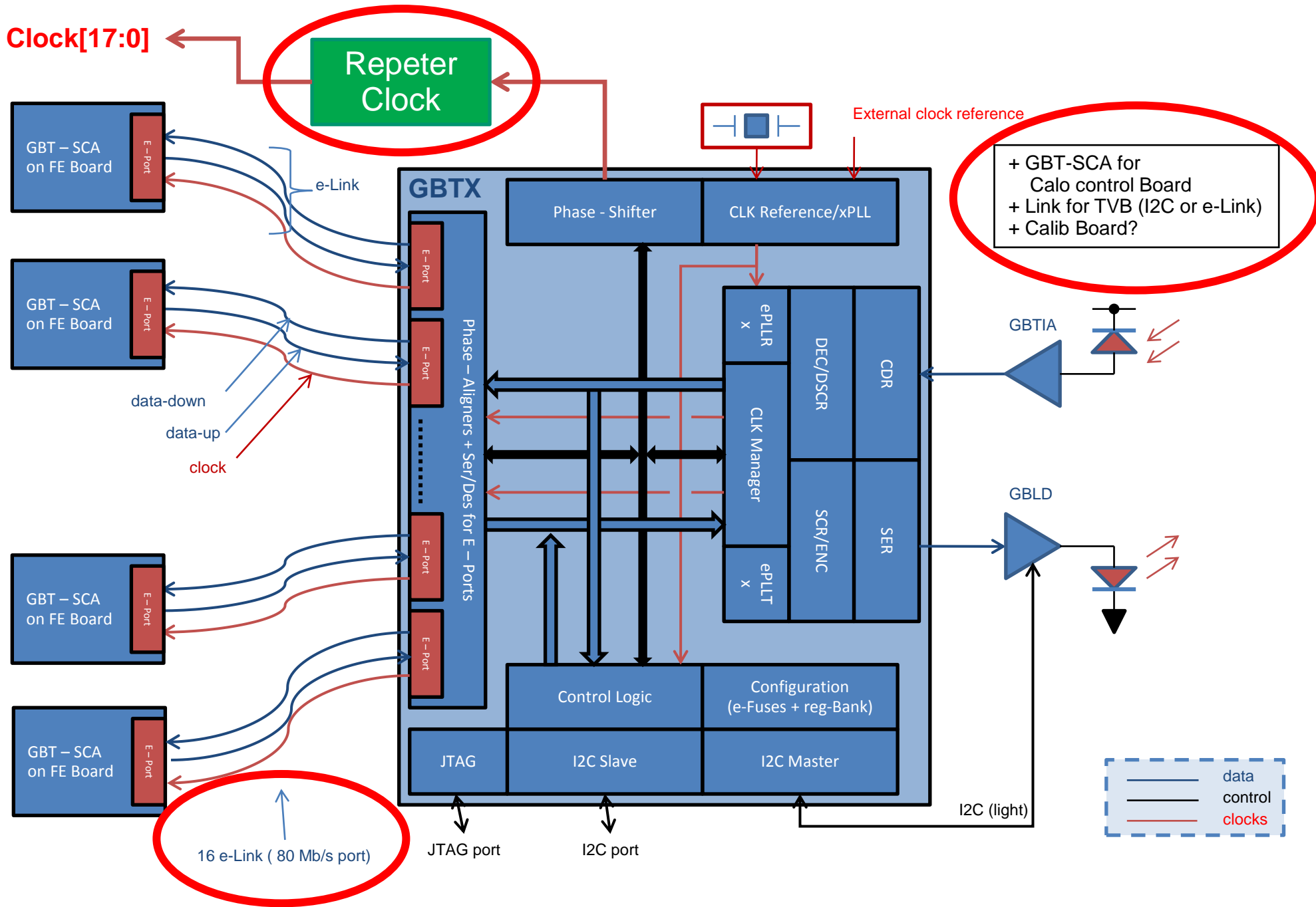
# ECAL/HCAL Backplane Crate resources



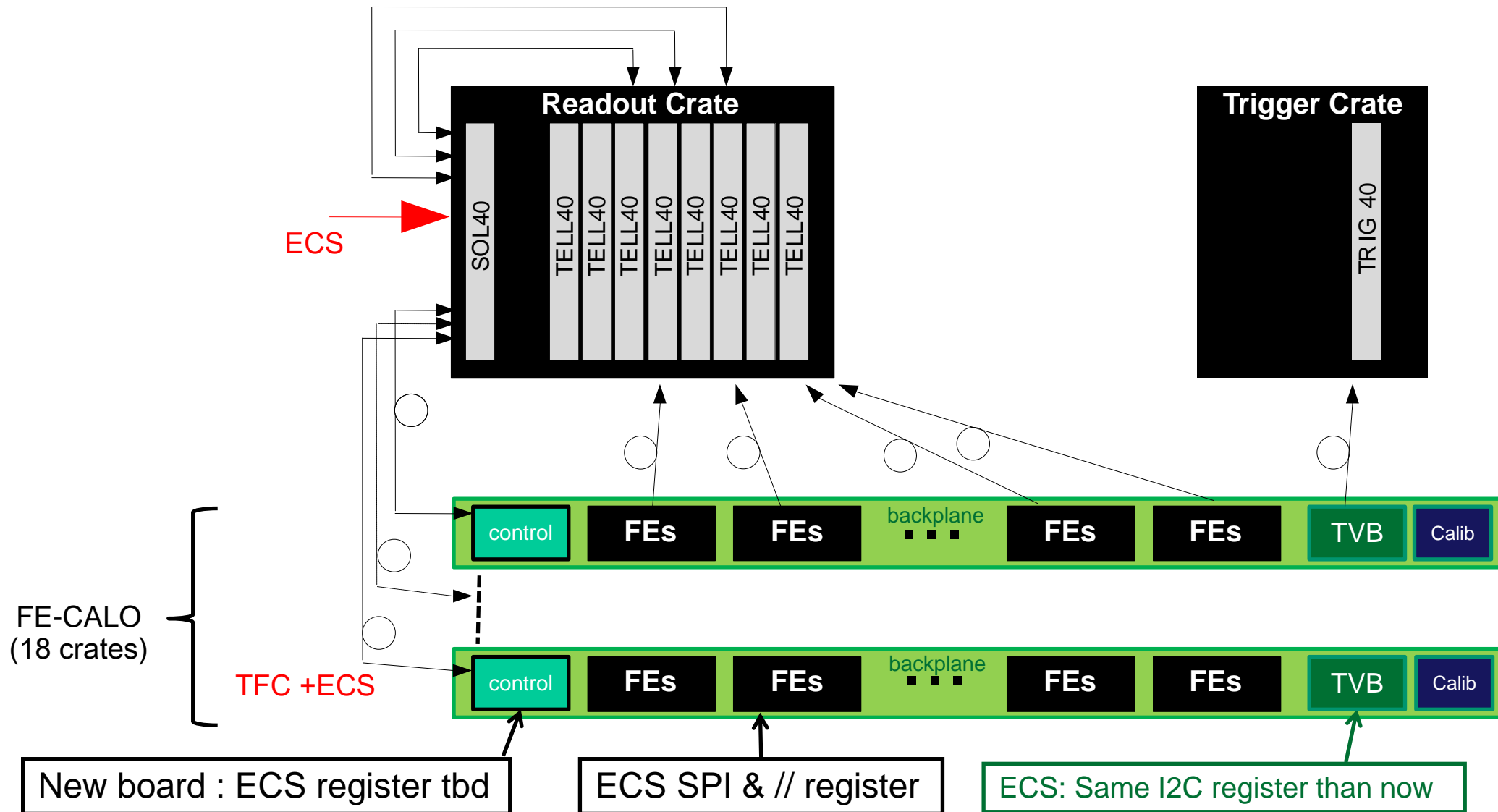




# GBT on Calo Control Board

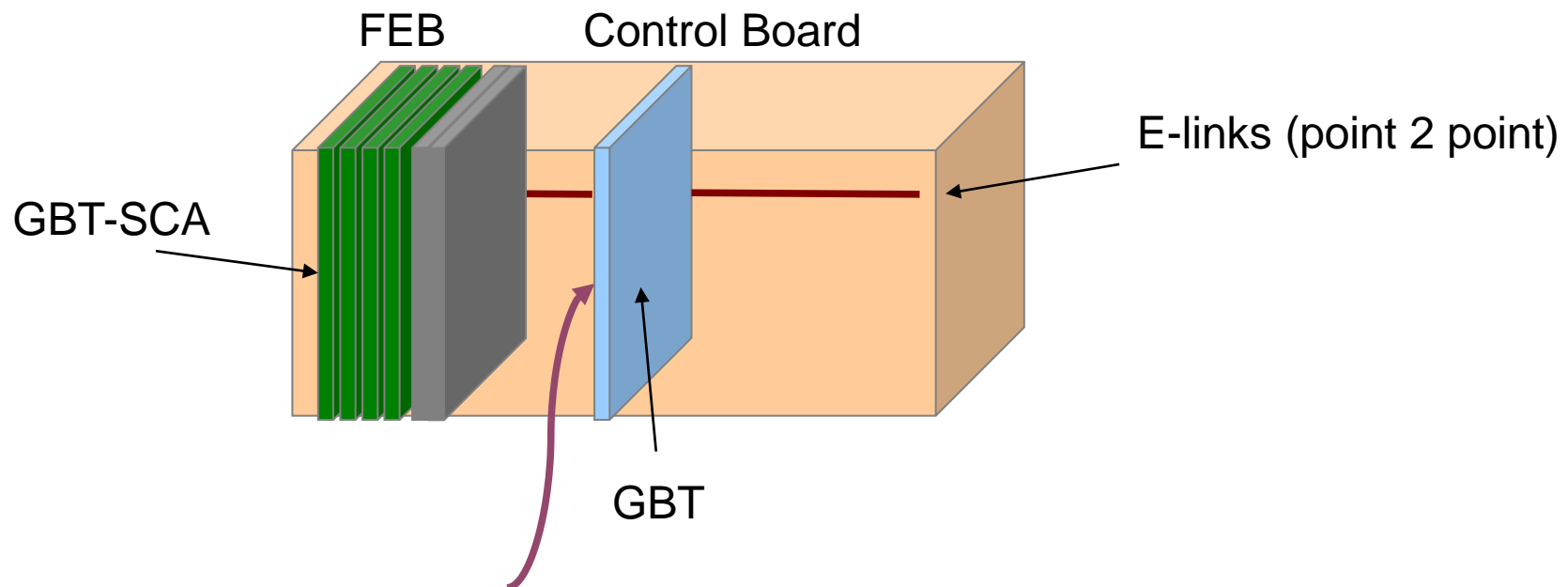


## ECS register FE-CALO



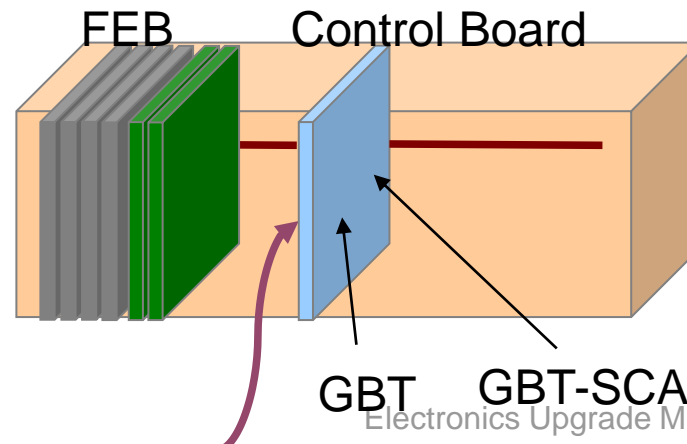
# Case 1 : New electronics in crate

- Backplane is kept as is but many lines are not necessary anymore
  - Use them for ECS point to point connections
- A new control board must be designed → GBT-ECS fibre connection
  - GBT receiver on the control board
  - Propagate e-links on the backplane (SVLS @80MHz → to be tested!)
  - Receive the signal with a GBT-SCA chip on the boards (FEB)
    - Generates SPI and // bus for slow control on the FE boards



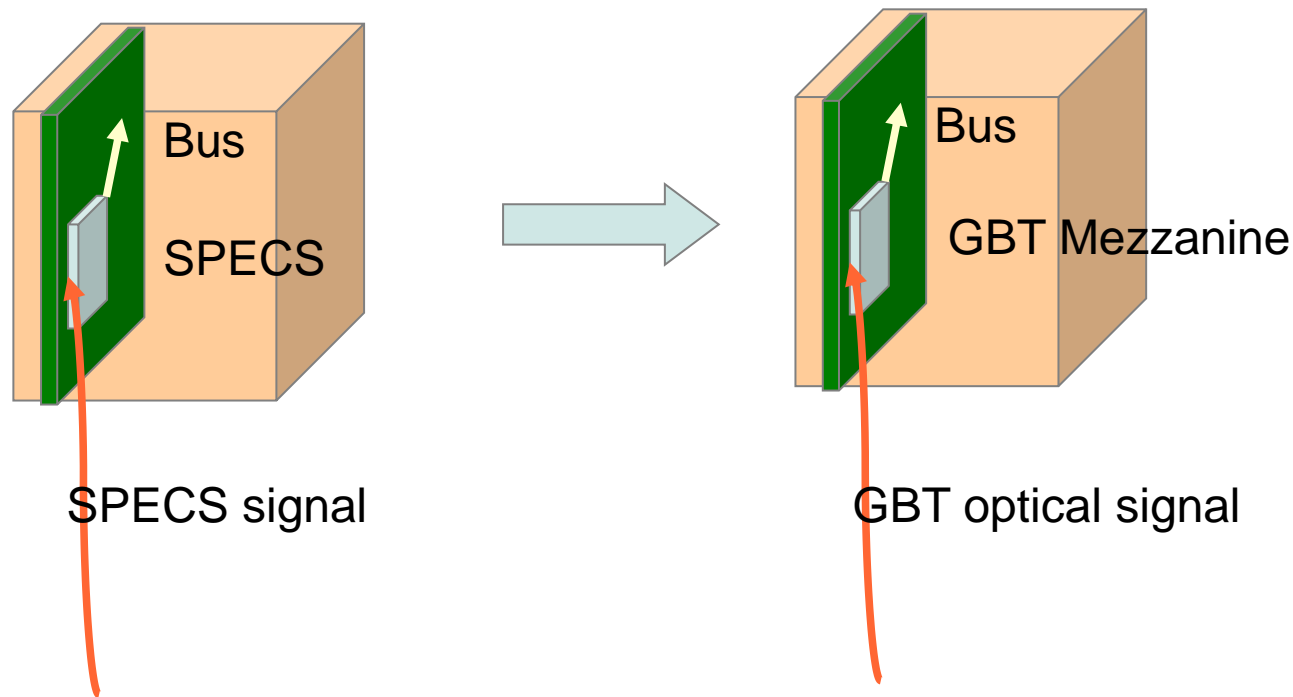
## Case 2 : Old electronics in crate (SPECS Glue)

- Some boards should be kept
  - ECS input is currently SPECS bus
  - Replace the signal from SPECS frame to I2C frame
    - This is not obvious : SPECS is here a mono-directional SPECS !
    - May have to add a FPGA on Control board to make it transparent for the GBT
      - Firmware has to be written
  - Reprogram the SPECS slave to make it a I2C→I2C transmitter (Firmware)
  - The board directly receives I2C from the control board
    - GBT-SCA on the control board
    - Could this solution also be used for case 1 ?



## Case 3 : SPECS Mezzanine

- The SPECS mezzanine have to be replaced by a “GBT equivalent”
  - This would consist in replacing the SPECS mezza. by a GBT one
    - Yuri Guz from the calorimeter group volunteered to realize this
      - Difficulties : GBT frequency, power supply, signal levels,...



# Conclusion

- Those are just ideas
  - Deeper thinking with experts of the different boards is needed
  - Preliminary tests are mandatory (usage of the backplane for e-link, clock, ...)
  - This is heavily connected with the control board design
- Could imagine several alternatives and variations
  - It could be safer to have a bi-directional GBT link per FEB
    - But costs increases → not the baseline
- Plan to use SPI on the FE board
  - Block already available (LAL)
  - SPI with addressing and chip select to avoid long frames:
    - Address: 7 bit for register selection
    - Chip select: should be generate externally
      - More than 10 chip select signals needed, not enough in GBT-SCA
  - GBT parallel bus could be used to generate chip selects
    - Asynchronous command
    - Discussion with GBT experts has started
- FPGA for ECS needed on the FEB
  - Reprogram the one of the TVB